

Title: Olefin Production Process
Serial No. 08/951,201
Filed 10/14/97

REMARKS

I. STATUS OF THE CLAIMS

Claims 1-6 and 22-33 are pending in the present application, prior to this amendment. Claims 1, 22, and 28 are amended to provide that Applicants' invention is directed an olefin trimerization system including, *inter alia*, a loop reactor. In light of this amendment, the limitation that the system is for a "homogenous catalyst" system is removed, as it is no longer needed to distinguish the claims over any of the references of record. Instead, the use of a "homogeneous catalyst system", which is fully supported by the specification, is recited in new claims 34-36, discussed below. Support for the amendments to claims 1, 22, and 28 can be found throughout the specification, and in particular, on page 18, lines 7-8. No new matter is added by this amendment.

Claims 34-36 are added. Claims 34-36 are generally directed to an olefin trimerization system for a homogenous, liquid catalyst system. Support for new claims 34-36 can be found throughout the specification, and in particular, in Examples 1-2, page 16 line 21 through page 23, line 17. No new matter is added by this amendment.

II. CLAIM REJECTIONS UNDER 35 U.S.C. §112

Claims 1-6 and 22-27 are rejected under 35 U.S.C. §112 as allegedly failing to comply with the written description requirement. Specifically, claim 1 was rejected on the basis that the recitation of a "homogeneous catalyst system" is allegedly not supported by the specification. Additionally, claim 22 was rejected on the basis that the limitation, "wherein the reactor does not employ a fluidized bed", is allegedly not supported by the specification.

The written description requirement of 35 U.S.C. § 112, first paragraph, is set forth as follows:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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To satisfy the written description requirement of an application, "the originally-filed disclosure would have conveyed to one having ordinary skill in the art that an appellant had possession of the concept of what is claimed."¹ Both the Court of Appeals for the Federal Circuit and the PTO have rejected any requirement that the specification have an exact or *in haec verba* description of the claimed invention.² Rather, the written description requirement is satisfied by the disclosure of such descriptive means as words, structures, figures, diagrams, formulas, and the like, that fully set forth the claimed invention.³ Thus, the artisan must reasonably discern the limitation at issue in the claims when reading the original disclosure.⁴

Regarding claim 1 of the present application and its associated dependent claims, Applicants respectfully maintain that the recitation of a "homogeneous" catalyst system finds ample support within the specification. While the term "homogeneous" is not exactly, or *in haec verba*, set forth in the specification, one of ordinary skill would readily recognize that the claimed catalyst composition is homogeneous.

It is well known by those of ordinary skill in the art that a homogenous catalyst system is one that is formed of a single phase—solid, liquid, or gas. Each of the systems disclosed in Examples 1 and 2 are homogenous liquid catalyst systems. In particular, each catalyst system is prepared by dissolving the catalyst in a solvent, such as toluene, ethylbenzene, or cyclohexane, resulting in a liquid catalyst system. Accordingly, Applicants maintain that the specification provides literal support for a homogeneous catalyst system. As such, Applicants respectfully request that the rejection of claim 1 and its associated dependent claims 2-6 under 35 U.S.C. §112 be withdrawn.

Additionally, claim 22 is rejected under 35 U.S.C. §112 as allegedly failing to comply with the written description requirement for reciting "wherein the reactor does not employ a

¹ *Ex Parte Parks*, 30 USPQ2d 1234, 1237 (Bd. Pat. App. & Inter. 1993). See also Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, ¶ 1 "Written Description" Requirement, 66 Fed. Reg. 1099, 1104 (Jan. 5, 2001).

² *Crown Ops. Int'l, Ltd. v. Solutia Inc.*, 289 F.3d 1367, 1376 (Fed.Cir. 2002) and Guidelines at 1105. See also *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563, 19 USPQ2d 1111, 1116 (Fed.Cir. 1991).

³ *Crown Ops.*, 289 F.3d at 1376.

⁴ *Id.*

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fluidized bed". Applicants have amended claim 22 to state that the reactor is a loop reactor, thereby mooting the rejection. As known by those of ordinary skill in the art, a loop reactor does not employ a fluidized bed. As such, Applicants respectfully request that the rejection of claim 22 and its associated dependent claims 23-27 under 35 U.S.C. § 112 be withdrawn.

III. CLAIM REJECTION UNDER 35 U.S.C. § 102(b)

Claims 1, 2, 4, 28, 29, and 31 are rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*). In view of the present amendments to claims 1 and 28, Applicants respectfully assert that the rejection is obviated and request that this rejection be withdrawn.

Applicants' invention as set forth in claims 1 and 28 is generally directed to an olefin trimerization apparatus including a loop reactor, first and second inlet lines operably and independently connected into the reactor, a reactor effluent line, and a separator operably connected to the reactor effluent line. The separator is external to the reactor. After the olefin reactant, catalyst, and trimerization reaction products are removed from the reactor via the reactor effluent line, the separator separates desired trimerization reaction products.

Avidan is directed to a catalytic technique for upgrading olefin streams rich in dienes to heavier hydrocarbons rich in aliphatics and aromatics. *Avidan* uses a fluidized bed reactor that includes a plurality of sequentially connected cyclone separator means 30, 32, and 34 (FIG. 1) provided with diplegs 36, 38 and 40 (FIG. 1) positioned in an upper portion of the reactor vessel (col. 7, lines 14-17). The product effluent of *Avidan* is separated from catalyst particles in the cyclone separating system inside the reactor (col. 7, lines 19-20). The effluent then passes to a plenum chamber, still inside the reactor, before withdrawal from the reactor via a conduit (col. 7, lines 19-21).

Given that *Avidan* does not teach or suggest use of a loop reactor, *Avidan* clearly does not anticipate Applicants' invention as set forth in amended claims 1 and 28, and their associated dependent claims. Since *Avidan* fails to teach every element of Applicants' claimed invention, the rejection of claims 1, 2, 4, 28, 29, and 31 under 35 U.S.C. § 102(b) over *Avidan* is obviated and should be withdrawn.

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IV. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(a)

A. Rejection of Claims 22, 23, and 25 under 35 U.S.C. §103(a) over *Avidan* in view of *Kissin*

Claims 22, 23, and 25 are rejected under 35 U.S.C. §103(a) as being allegedly obvious over U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*) in view of U.S. Patent No. 6,153,551 to Kissin et al. (*Kissin*). In view of the present amendments to Claim 22, Applicants respectfully assert that the rejection is obviated and request that this rejection be withdrawn.

Applicants' invention as set forth in amended Claim 22 is generally directed to an olefin trimerization system. The system includes a loop reactor having a first inlet line for olefin reactant operably connected into the reactor from a first source of olefin reactant, a second inlet line for catalyst operably connected into the reactor from a source of catalyst, a reactor effluent line for transferring olefin reactant, catalyst, and trimerization reaction products from the reactor, and a separator external to the reactor and operably connected to the reactor effluent line to separate the trimerization reaction products.

As stated above, *Avidan* does not teach or suggest use of a loop reactor. Instead, *Avidan* is directed to an improved fluidized bed reactor.

Kissin does not cure the deficiencies of *Avidan*. *Kissin* is directed to a supported heterogeneous catalyst that is the contact product of two components (col. 1, lines 20-21). *Kissin* makes no mention of using a loop reactor to polymerize an olefin. In fact, *Kissin* specifies that "[t]he dried catalyst of this invention...can be fed to a gas-phase fluidized bed reactor or to a slurry reactor for polymerization and copolymerization of ethylene..." (col. 5, lines 50-53).

Given that *Avidan* and *Kissin*, alone or in combination, fail to teach use of a loop reactor as recited in amended claim 22, the combination of *Avidan* and *Kissin* is insufficient to support a rejection of claim 22 and its associated dependent claims 23 and 25 under 35 U.S.C. §103(a). As such, it is respectfully requested that the rejection be withdrawn.

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B. Rejection of Claims 3, 24, and 30 under 35 U.S.C. §103(a) over *Avidan* in view of *Lashier*

Claims 3, 24, and 30 are rejected under 35 U.S.C. §103(a) over U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*) in view of U.S. Patent No. 5,689,028 to Lashier et al. (*Lashier*). In light of the present amendment to claim 1, from which claims 3, 24, and 30 depend, this rejection is obviated. As such, Applicants respectfully request withdrawal of this rejection.

As stated above, *Avidan* is directed to a fluidized bed process. It does not teach or suggest use of a loop reactor.

There is no motivation to supplement the teachings of *Avidan* with the teachings of *Lashier*. *Lashier* is directed to a process for inhibiting a trimerization catalyst system (col. 1, lines 39-40). It is not directed to a reactor of any kind, and in particular, it is not directed to a loop reactor. Thus, one having ordinary skill in the art would not look to *Lashier* to modify the fluidized bed reactor of *Avidan*.

Furthermore, even if the references are combined, the combination of *Avidan* and *Lashier* fails to teach all elements of Applicants' claimed invention. Specifically, neither *Avidan* nor *Lashier*, alone in combination, teaches use of an olefin trimerization system that includes a loop reactor.

Given that *Avidan* and *Lashier*, alone or in combination, fail to teach use of a loop reactor as recited in amended claim 1, the combination of *Avidan* and *Lashier* is insufficient to support a rejection of claim 1 and its associated dependent claims 3, 24, and 30 under 35 U.S.C. §103(a). As such, Applicants respectfully request withdrawal of this rejection.

C. Rejection of Claims 5, 26, and 32 under 35 U.S.C. §103(a) over *Avidan* in view of *Harandi*

Claims 5, 26, and 32 are rejected under 35 U.S.C. §103(a) as being allegedly obvious over U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*) in view of U.S. Patent No. 4,788,366 to Harandi et al. (*Harandi*). In view of the present amendments to claim 1, from which claims 5, 26, and 32 depend, this rejection is obviated and should be withdrawn.

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As stated previously, *Avidan* is directed to a fluidized bed process. *Avidan* does not teach an olefin trimerization system including a loop reactor. *Harandi* does not cure the deficiencies of *Avidan*. *Harandi* is directed to a fluidized bed reactor system (col. 6, lines 15-16). *Harandi* does not teach or suggest use of a loop reactor.

Given that *Avidan* and *Harandi*, alone or in combination, fail to teach an olefin trimerization system that uses a loop reactor as recited in amended claim 1, the combination of *Avidan* and *Harandi* is insufficient to support a rejection of claim 1 and its associated dependent claims 5, 26, and 32 under 35 U.S.C. §103(a). As such, Applicants respectfully request withdrawal of this rejection.

D. Rejection of Claims 6, 27, and 33 under 35 U.S.C. §103(a) over *Avidan* in view of *Mehra*

Claims 6, 27, and 33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*) in view of U.S. Patent No. 5,521,264 to Mehra et al. (*Mehra*). In view of the present amendments to claim 1, from which claims 6, 27, and 33 depend, Applicants respectfully assert that this rejection is obviated and request that this rejection be withdrawn.

As stated previously, *Avidan* does not teach or suggest a loop reactor, as recited in claims 1, 22, and 33. Instead, *Avidan* teaches a fluidized bed reactor. *Mehra* does not cure the deficiency of *Avidan*. *Mehra* is directed to a gas phase olefin polymerization process (col. 3, lines 65-66). *Mehra* does not teach or suggest an olefin trimerization system that uses a loop reactor.

Given that *Avidan* and *Mehra*, alone or in combination, fail to teach use of a loop reactor to polymerize an olefin as recited in amended claim 1, the combination of *Avidan* and *Mehra* is insufficient to support a rejection of claims 1 and its associated dependent claims 6, 27, and 33 under 35 U.S.C. §103(a). Accordingly, Applicants respectfully request that the rejection of Claims 6, 27 and 33 under 35 U.S.C. § 103(a) over *Avidan* in view of *Mehra* be withdrawn.

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V. NEW CLAIMS

New claims 34-36 are presented by this amendment. Claims 34-36 are generally directed to an olefin trimerization system for a homogenous, liquid catalyst system. Claim 34-36 are believed to be allowable in that none of the cited references teach or suggest an olefin trimerization system for a homogenous, liquid catalyst system as recited therein.

VI. CONCLUSION

In view of the foregoing remarks, Applicants respectfully assert that the rejection of the claims as set forth in the Office Action of May 5, 2004 have been addressed and overcome. Applicants further respectfully assert that all claims are in condition for allowance and request that a Notice of Allowance be issued. If issues may be resolved through Examiner's Amendment, or clarified in any manner, a call to the undersigned attorney at (404) 879-2433 is respectfully requested.

Respectfully submitted,


Dana E. Stano
Reg. No. 50,750

Date:
Womble Carlyle Sandridge & Rice, PLLC
P.O. Box 7037
Atlanta, GA 30357-0037
(404) 879-2433 (direct)
(404) 879-2433 (facsimile)

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